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Co-infection with Human Immunodeficiency Virus and Hepatitis C Virus among Injecting Drug Users in North-Eastern States of India

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Abstract

Background: Co-infection with human immunodeficiency virus (HIV) and hepatitis C virus (HCV) is a significant problem, especially among injection drug users (IDUs). Co-infection with HIV and HCV is a significant global public health problem. The study aims to examine co-infection with human immunodeficiency virus (HIV) and hepatitis C virus (HCV) among injecting drug users (IDUs) in North-eastern states of India.

Materials & method: Data were obtained from a cross-sectional bio-behavioural survey Integrated behavioural and biological assessment round 2 (2009-2010) among 1650 IDUs in two north-eastern states, Manipur and Nagaland of India. Univariate with Chi-square test and Binary logistic regression were used for analysis.

Results: Co-infection with HIV and HCV was found 15.0% of IDUs in the North-East state of India. The HCV prevalence was 93% among HIV positive IDUs and 34.4% among HIV-negative IDUs respectively. The prevalence of HIV in HCV positive and in HCV negative was 34.3% and 1.7%, respectively. Univariate analysis with Chi-Square test found that age, education, marital status, living status, age at first starting drug use, age at first injecting drug use, duration of first drug use and first injecting drug, shared needle/syringes with partner, injection with prefilled syringe, draw up drug solutions from a common container, cleaning of needle/syringes and being sexually active were significantly associated with coinfection with HIV and HCV. Multivariate logistic regression revealed that divorced/separated/widowed (2.8 times, $p \leq 0.001$), age at starting drug use 26 years and above (2.2 times, $p \leq 0.001$), draw up drug solution from a common container (1.8 times, $p \leq 0.10$), injection with prefilled syringes (1.3 times, $p \leq 0.002$), cleaning of needle/syringes (2.9 times, $p \leq 0.05$) and sexually active (0.56 times, $p \leq 0.05$) were independently associated with co-infection with HIV and HCV.

Conclusion: Study emphasizes that there should be preventive strategies to control hepatitis C infection among IDUs.

Keywords:

Coinfection; HIV; Hepatitis C

Background

Co-infection with HIV and hepatitis C virus (HCV) is a significant problem, especially among injection drug users (IDUs). Care for individuals living with both diseases is complex. Hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are the two pathogens most commonly transmitted by drug users through the multi-person use ("sharing") of drug injection equipment. These two pathogens are also likely to be responsible for the highest infectious disease morbidity and mortality rates among drug injectors worldwide. While both of these viruses can be transmitted through multi-person use of syringes and presumably via other drug injection equipment, there are important differences in the transmission dynamics of each virus within a population of injecting drug users [1]. Hepatitis C virus infection is less known to public health community than HIV in terms of health and social crisis, but it is also a concern. HCV is transmitted by exposure to infected blood and it is predominantly found in IDUs. Further several studies have documented a high prevalence of infection with hepatitis C virus among injecting drug users, both in industrialised and developing countries. Although the longer duration of drug use has been consistently associated with higher prevalence of hepatitis C virus infection among this population, high prevalence has also been reported among both young injecting drug users and those who have been injecting for a relatively short time. Studies of hepatitis C virus incidence have found high levels of transmission among current injecting drug users [2]. Moreover, co-infection with HCV and HIV is not uncommon and has become a global public health problem, causing an increased rate of progression to cirrhosis, decompensated liver disease, hepatocellular carcinoma, and death [3].

Global estimates indicate that there are 15.9 million (range 11.0-21.2 million) people who inject drugs (PWID) across 151 countries [4, 5]. Of these, approximately three million (range

0.8-6 million) PWID are HIV infected [4]. In Southeast Asia, 70% to 86% of IDUs in the Philippines, southern China and Thailand were infected with HCV. In India the prevalence of hepatitis C infection was very high in Manipur (56% in Bishnupur and 78% in Churachandpur), but lower in Nagaland (5.4% in Phek and 16.7% in Wokha). India is estimated to have 168,000-1.1 million IDUs with HCV antibody prevalence ranging from 5 to 93 percent [6-8] among HIV+ IDUs. The Main objective of the study is to understand and determine the factors that are pacing the co-infection of HIV and HCV in the north-eastern states of India.

Data and methods

To study the co-infection with HIV and HCV, a cross-sectional bio-behavioural survey Integrated Behavioural and Biological Assessment round 2, 2010 data has been used to study the risk factor for co-infection with HIV and HCV. IBBA round 2 surveys collect the information among injecting drug users from Maharashtra (Mumbai/Thane combined) and the north-Eastern states (Churachandpur & Bishnupur from Manipur and Phek & Wokha from Nagaland). It provides the information to understand the IDUs characteristics and risky behaviours. IBBA second round was done in 2009-2010 by the Indian Council of Medical Research, National AIDS Research Institute, in partnership with Family Health International and was implemented in close collaboration with National AIDS Control Organization (NACO) and State AIDS Control Societies (SACS). The IBBA is funded by the Bill and Melinda Gates Foundation (BMGF) and was conducted in Avahan project states of Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka, Manipur and Nagaland and along the selected stretch of National Highways. In this study only IDUs of North-East states of Manipur and Nagaland has taken. IDUs were selected on the criteria of those who were 18 years or older, who injected addictive substances/ drugs for non-medical purposes at least once in past six months. A sample size of 400 was estimated for each survey district. As a result of the clandestine nature of IDU, respondent-driven sampling (RDS), a social network-based sampling technique was used. Total 1650 IDUs were selected from Manipur (821 IDUs) and Nagaland (829 IDUs) in north-eastern states of India

The dependent measures in this study are co-infection with HIV and HCV which is created by the two key variables; (1) HIV prevalence and (2) HCV prevalence. The independent variable was age, education, marital status, occupation, age at first drug use, age at first injecting drug, duration of first drug use to first injecting drug, Injection with prefilled syringes, draw up drug solution from the common container, cleaning of needle / syringes and sexually active in last 12 months.

Univariate and bivariate analysis was used to understand the prevalence of HIV/HCV co-infection among IDUs by their background characteristics. Chi-square test statistics was to examine the association between HIV/HCV co-infection and background characteristics at 5 percent level of significance ($p \leq 0.05$). To identify the factor associated with co-infection with HIV and HCV Binary logistics regression was used to estimate odds ratios.

Results

Among 1648 IDUs, the prevalence of HIV/HCV co-infection was 15 percent in north-eastern states of India **(Table 1)**. The HCV prevalence was 93% among HIV positive IDUs and 34.4% among HIV-negative IDUs respectively. The prevalence of HIV in HCV positive and in HCV negative was 34.3 percent and 1.7 percent, respectively in **Table 1**. Overall HIV prevalence among injecting drug users in North-eastern states of India is 16 percent and HCV prevalence is 44 percent. The results indicate that most of the IDUs who have HIV were already infected with Hepatitis C Virus. Studies have shown that HIV infection in a person who is also infected with HCV results in higher levels of HCV in the blood, more rapid progression to HCV-related liver disease, and increased risk for cirrhosis and liver cancer. As a result, HCV is now regarded as an opportunistic infection in people with HIV infection, although it is not considered an AIDS-defining illness [9].

Table 1 Co-infection with HIV and hepatitis C virus (HCV) among IDUs.

	HIV Serostatus		
HCV Serostatus	**Negative**	**Positive**	**Total**
Negative	908	16	924
Positive	476	248	724
Total	1384	264	1648

Table 2 shows the risk factor associated with co-infection with HIV and HCV among injecting drug users according to their background characteristics. IDUs belongs to 25 and above years ($p<0.01$), 6 and above years of education ($p<0.05$), married & divorced/separated/ widowed ($p<0.01$), occupation ($p<0.01$), age at first drug use ($p<0.01$), age at first injecting drug use ($p<0.05$), duration of first drug use to first injecting drug use ($p<0.01$), Sharing needle/syringes with partners in the past month ($p<0.10$), Injection with prefilled syringe ($p<0.01$), Draw up drug solutions from common container ($p<0.01$), cleaning needle/syringes ($p<0.01$), and sexually active in last 12 month ($p<0.05$), are significantly associated with co-infection of HIV and hepatitis C virus (HCV). The table clearly indicate that the prevalence of co-infection with HIV and HCV are higher among 25 and above years of IDUs (20.3%), 1-5 years of education (21.3%), divorced/separated/widowed (35.3%), started drug use

at age 26 and above (24.8%), started first injecting drugs age at 26 and above (17.4%), 6 and above years of duration from first drug use to first injecting drug (18.4%), injection with prefilled syringes (17.5), draw up drug solution from common container (16.4) than their other counterparts.

Table 2 Risk factors associated with co-infection with HIV and hepatitis C virus (HCV) among IDUs in the North-Eastern state of India, ®=Reference, *=p ≤ 0.10, **=p ≤ 0.0.05, ***=p ≤ 0.0.001.

	HIV and HCV co-infection			
Background Characteristics	**Total**	**Prevalence**	**p-Value**	**Odds Ratio EXP(β)**
Age (years)				
18-24®	471	1.9	0	
25 and above	1179	20.3		14.735***
Education				
Illiterate®	166	12.7	0.018	
1-5 years	89	21.3		2.104
6-10 years	821	16.9		2.884***
11 years and above	576	12		2.306**
Marital status				
Unmarried®	946	9.1	0	
Married	549	19.7		1.973***
Divorced/Separated/Widowed	153	35.3		3.606***
Occupation				
Worker®	209	27.8	0	
Agriculture	225	20.9		0.496**
Salaried/self-employed/ Businessman	354	11.3		0.244***
Student/Unemployed	829	10.9		0.346***
Others	33	39.4		1.248
Age at first drug use(years)				
20 or less®	766	10.3	0	
21-25	391	11.8		1.151
26 and above	495	24.8		2.280***
Age at first Injecting drugs(years)				
20 or less®	588	16	0.054	
21-25	622	12.4		0.376***
26 and above	442	17.4		0.421***
Duration between first drug use and first injection (years)				
1or below®	168	1.8	0	
1-5	182	3.3		0.771
6 and above	1302	18.4		4.073**
Partners shared needle/syringe in the past month				
No®	995	17.4	0.09	
Yes	455	13.8		0.89
Injection with prefilled syringe				
NO®	663	11.8	0.002	
Yes	973	17.5		1.261
Draw up drug solutions from a common container				
NO®	302	8.9	0.001	
Yes	1345	16.4		1.736*
Cleaning of needle/syringes				
No®	189	3.7	0	
Yes	1431	16.8		3.050**
Sexually active In past 12 month				
No®	287	23.3		
Yes	1209	13.6	0.013	0.516

The analysis of binary logistics regression of co-infection with HIV and HCV reveals that older IDUs, 6-10 years of schooling and divorced/separated/widowed are 14 times, 2.9 times and 3.6 times more likely to have co-infected with HIV and HCV respectively. It was also found that those IDUs started drug use at the age of 26 and above is 2.28 times more likely to have co-infected with HIV and HCV. One important finding of the study is those IDUs started first injecting drug after 6 and above years of first drug use, are approximately 4 times more likely to have co-infection with HIV and HCV. IDUs, co-infected with HIV and HCV are 1.7 times more likely among those IDUs who draw up drug solutions from a common container. The behaviour of cleaning needle/syringes by IDUs is also 3 times more probable to co-infect with HIV and HCV.

Discussion & Conclusion

HCV infection with HIV is an important public health issue. It could reduce the spontaneous clearance of HCV; increase its viral load which results in severe presentation of the disease and faster progression to liver failure [10]. Further, several studies revealed that HBV and HCV co-infection with HIV could faster HIV/AIDS progression and its related morbidity and mortality [11, 12].

In this study the risk factor associated co-infection with HIV and Hepatitis C virus among Injecting drug users in North-eastern states of India was studied. The risk for HIV/HCV co-injection is high among injecting drug users. A study also portrays that people who inject drugs constitute the largest proportion of a specific population that is co-infected with HIV

and HCV [13]. In the United States, it has been estimated that 25 percent of IDUs infected with HIV are also infected with HCV [14].

The study reported that older age of IDUs and 6 and above years of educated IDUs is more probable to have co-infected with HIV and HCV. The reason for the finding that educated (6 and above years of schooling) IDUs was significantly more likely to be co-infected than their counterparts could be that they had the knowledge about the drugs from where they can get for injecting. One important finding of the study is that co-infection with HIV and HCV was being associated with Divorced/ Separated/Widowed and are more likely to be infected, which was probably revealing of IDUs coming from the more chronic end of the drug using spectrum and therefore, more at risk of co-infection of HIV and HCV [15].

The finding of the study highlights that co-infection with HIV and HCV among IDUs is independently associated with age at first drug use and age at first injecting drug use. It's revealed that IDUs of age let entry into first drug use are more likely to be co-infected with HIV and HCV. On the other hand, IDUs of age at early entry into injecting practice are more prone to be infected than their other counterparts. Similar kind of result was found in a study of Iran where, the beginning age of addiction in most participants was ≤ 20 years old [16]. We found that duration of first drug use to first injecting the drug, sharing of needle or syringes in the past one month, Injection with prefilled syringes, draw up drug solution from the common container and cleaning of needle or syringes were significantly associated with co-infection HIV and HCV. Sharing of needle/syringe with other partners is a most important factor that can spread the infection to the general population. Needle/syringe sharing behaviour is most notable for transmission of human immunodeficiency virus (HIV) and hepatitis C virus, though other infections are also transmitted via needle syringe sharing, including hepatitis B virus, human T-lymph tropic viruses, and malaria [17]. Further, IDUs, 6 and above years of duration between first started drugs use to first started injecting drug use is more likely to have co-infected with HIV and HCV in this study. It may be because the lack of awareness about safe injection practices.

The findings of the study highlight that high HIV/HCV co-infection among injecting drug users in the north-eastern states of India where prevention, diagnosis and treatment opportunities are limited. It is highly probable that others states such as Punjab and other metropolitan cities of India with injecting drugs use problem are likewise pretentious. It is also evident that HCV infection was more common than HIV seropositivity. It would be very helpful for Injecting drug users, who come for HIV testing, should also be tested for HCV infection at the same time. Study emphasizes that there should be preventive strategies to control hepatitis C infection among IDUs not only for HIV.

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